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12

SECTION

Water Quality

UTAH STATE WATER PLAN - WEBER RIVER BASIN PLAN

The quality of life, to a large extent, is dependant on the quality of water within a given area or region of consideration. Water is not only a basic element of life, it dictates the quality of the environment that supports all living things.

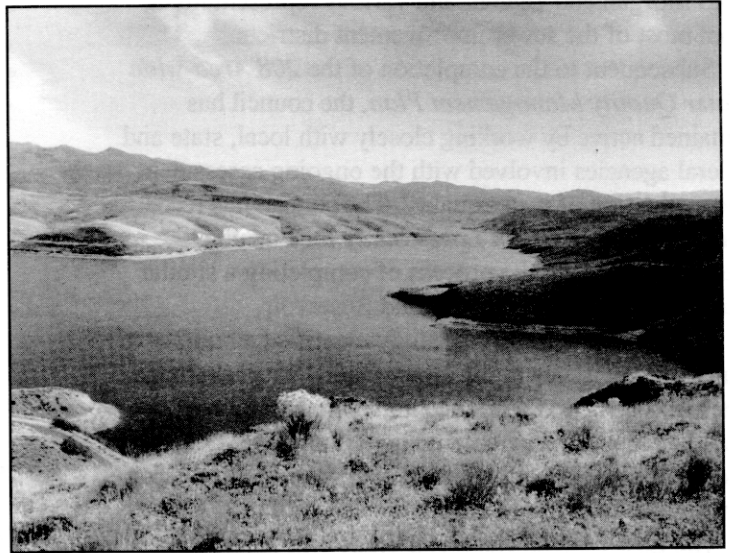
12.1 Introduction

This section of the *Weber River Basin Plan* presents discussions and information relating to water quality. Included are discussions regarding the administration and enforcement of water pollution control regulations, current and future status of water quality, and pertinent issues and problems.

12.2 Setting

Until the mid-1950s when the growing size of residential and commercial developments began to require large-scale sewage collection and treatment, water quality was not much of an issue. Prior to the construction of major military bases and large-scale urban development, the basin primarily consisted of sparsely populated rural communities with individual wells for culinary water and septic tanks with drain fields providing a means of sewage disposal. Public sewage collection and treatment facilities existed only in larger municipalities along the Wasatch Front, mostly in Weber and Davis counties.

With the establishment of Hill Air Force Base, the Defense Depot Ogden, and a significant increase in railroad activity, the basin's population grew at a relatively rapid rate from the early 1940s to the late 1960s. To accommodate this growth, public works facilities were expanded to service a number of rural towns, cities and commercial districts. As a result, existing wastewater treatment facilities were upgraded to provide secondary treatment with enlarged sanitary sewers and culinary water distribution systems.



East Canyon Reservoir

12.3 Organizations and Regulations

The responsibility of protecting the basin's water quality falls primarily with the Division of Water Quality. Other federal and local agencies also have strong interests and responsibilities concerning the water quality. These agencies include the Environmental Protection Agency (EPA) and Weber Basin Water Quality Council (WBWQC). The EPA administers federal water quality law and regulations including the Clean Water Act. The Division of Water Quality, through the state legislature and Water Quality Board, establishes the state's water quality regulations in accordance with federal law and regulations. The WBWQC generally works in close

cooperation with the Division of Water Quality to monitor and assess the existing status of water quality throughout the basin.

12.3.1 Weber Basin Water Quality Management Council

The Weber Basin Water Quality Management Council is considered the lead agency in the basin regarding water quality in both the Weber and Ogden rivers. The council was initially organized in the mid-1970s to complete an EPA funded *208 Area-Wide Water Quality Management Plan* for the Weber and Ogden rivers. The initial members of the council included commissioners from Weber and Morgan counties; mayors from Centerville, Layton, Bountiful, Morgan, Roy and Harrisville; local town/city officials from Morgan and Ogden; and various representatives from most of the sewer improvement districts.

Subsequent to the completion of the *208 Area-wide Water Quality Management Plan*, the council has remained active by working closely with local, state and federal agencies involved with the ongoing assessment and evaluation of water quality. The council has recently completed a *314 Clean Lakes Study* for Pineview Reservoir and is in the process of completing a similar study for East Canyon Creek and Reservoir.

The Pineview Reservoir study identified a number of water quality issues in the upper Ogden River drainage. These issues include the potential contamination of surface and groundwater from agricultural field runoff and the infiltration of wastewater from residential septic tanks and related drain fields.

The East Canyon Reservoir study will assess water quality in the upper East Canyon Creek drainage. The study will also identify requirements to reduce current levels of nutrient contamination to East Canyon Creek and East Canyon Reservoir.

12.3.2 Utah Water Quality Regulations

Utah has long been aware of the importance of maintaining adequate levels of surface and groundwater quality. With the passage of the Utah Water Pollution Control Act of 1953 (UWPCA), a Water Pollution Control Committee (later changed to Water Quality Board) was created and given a number of responsibilities including the power to adopt, enforce and administer regulations designed to protect the state's water quality.

Surface Water - The Division of Water Quality has classified surface streams, rivers and reservoirs primarily

based on minimal acceptable levels of water quality for various intended uses. Six basic water use classifications have been established ranging from treatable water for culinary use to water sources unsuitable for human contact. These water use classifications are summarized in Table 12-1 for basin streams and reservoirs/lakes respectively.

Waters subject to the Antidegradation Policy of the "Standards of Quality for Waters" for the State of Utah are broken into two categories. No Category 2 waters are named for the Weber Basin. Category 1, high quality waters are all surface waters geographically located within the boundaries of the Wasatch-Cache National Forest whether on public or private lands, with the following exceptions:

- Weber River from the Town of Uintah to the Town of Mountain Green,
- Weber River and tributaries from U.S. 189 (near Wanship) to its headwaters,
- Burch Creek and tributaries from Harrison Boulevard in Ogden to its headwaters,
- Hardscrabble Creek and tributaries from confluence with East Canyon Creek to its headwaters,
- Chalk Creek and tributaries from U.S. Highway 189 (at Coalville) to its headwaters,
- Holmes Creek and tributaries from U.S. Highway 89 to its headwaters,
- Sheppard Creek and tributaries from Height Bench diversion to its headwaters,
- Farmington Creek and tributaries from Height Bench Canal diversion to its headwaters, and
- Steed Creek and tributaries from U.S. Highway 89 to its headwaters.

Since the initial passage of the UWPCA, 14 wastewater treatment facilities have been constructed in the Weber River Basin. These facilities include eight plants employing some form of mechanical secondary treatment and six plants employing facultative lagoon systems. A summary of the plants and their respective treatment processes is presented in Table 12-2.

From regulations established in the federal CWA, the Division of Water Quality is responsible for the enforcement of regulations dealing with point source discharges. Regulations cited in the CWA, state that ".....the discharge of any pollutant directly into the waters of the United States from a new or existing point source is prohibited unless the point source has a valid and active National Pollutant Discharge Elimination System (NPDES) permit...."

**Table 12-1
STATE SURFACE WATER USE CLASSIFICATIONS**

Class	Designated Use	Stream Reach
Class 1	Raw culinary water sources.	
Class 1C	Domestic use with prior treatment.	WR&TR: Stoddard Diversion to headwaters. SCC&TR: National Forest boundary to headwaters. BC&TR: Harrison Blvd. at Ogden to headwaters. SC&TR: National Forest boundary to headwaters. WC: Ogden River confluence to headwaters. PR: All tributary streams and rivers.
Class 2	Instream recreational use and aesthetics.	
Class 2A	Primary human contact-swimming.	All major reservoirs including: Smith and Morehouse, Rockport, Echo, Lost Creek, East Canyon, Causey, Pineview and Willard Bay.
Class 2B	Secondary human contact-boating, wading, etc.	WR: Great Salt Lake to Slaterville Diversion. WR&TR: Slaterville Diversion to Stoddard Diversion. WR&TR: Stoddard Diversion to headwaters. SCC&TR: National Forest boundary to headwaters. BC&TR: Harrison Blvd. at Ogden to headwaters. SC&TR: National Forest boundary to headwaters. OR&TR: Weber River confluence to Pineview Dam. WC: Ogden River confluence to headwaters. PR: All tributary streams and rivers.
Class 3	Instream use by aquatic wildlife.	
Class 3A	Habitat maintenance for cold water game fish, water-related wildlife and food chain organisms.	WR&TR: Slaterville Diversion to Stoddard Diversion. WR&TR: Stoddard Diversion to headwaters. SCC&TR: National Forest boundary to headwaters. BC&TR: Harrison Blvd. at Ogden to headwaters. SC&TR: National Forest boundary to headwaters. OR&TR: Weber River confluence to Pineview Dam. WC: Ogden River confluence to headwaters. PR: All tributary streams and rivers.
Class 3B	Habitat maintenance for warm water game fish, water-related wildlife and food chain organisms.	Not used in the Weber River Drainage.
Class 3C	Habitat for non-game fish, water-related wildlife and food chain organisms.	WR: Great Salt Lake to Slaterville Diversion.

Limits on loading rates by certain pollutants are usually established by state agencies with consideration given to EPA guidelines. However, state agencies can adopt more stringent limits. Wastewater treatment plants and/or industrial businesses discharging pollutants into Utah waters are issued a Utah Pollutant Discharge Elimination System permit (UPDES). Generally NPDES/UPDES permits are valid for a five-year period and must be renewed for a re-evaluation of pollutant limitations. Enforcement of NPDES/UPDES permit requirements is accomplished by effluent monitoring programs established and supervised by the Division of Water Quality. To this end, an intensified monitoring effort, consisting of 63 water quality monitoring sites, was put in place from April 1993 to June 1994. As

shown in Figure 12-1, the 63 sites include 20-long term sites in operation prior to 1993. Data collected from this intensive monitoring project were used to produce the *September 1995 Weber River Basin and Farmington Bay Area Stream Assessment* by the Division of Water Quality.

Groundwater - Groundwater accounts for approximately 50 percent of all culinary water diversions in the basin. Although this percentage is expected to decrease as new surface water treatment plants are constructed or as existing plants are expanded, groundwater will remain a major source of culinary water indefinitely. As such, it is important that the quality of groundwater be maintained through the continued implementation of monitoring programs.

Table 12-1 (Continued)
STATE SURFACE WATER USE CLASSIFICATIONS

Class	Designated Use	Stream/Reach
Class 3D	Habitat for waterfowl, shore birds, water-related wildlife and food chain organisms.	WR: Great Salt Lake to Slaterville Diversion.
Class 4	Agricultural-livestock and irrigation water.	WR: Great Salt Lake to Slaterville Diversion. WR&TR: Slaterville Diversion to Stoddard Diversion. WR&TR: Stoddard Diversion to headwaters. SCC&TR: National Forest boundary to headwaters. SC&TR: National Forest boundary to headwaters. OR&TR: Weber River confluence to Pineview Dam. WC: Ogden River confluence to headwaters. PR: All tributary streams and rivers.
Class 5	Great Salt Lake general use-primary and secondary human contact, water-related wildlife and mineral extraction.	Great Salt Lake and surrounding waterfowl and wildlife management areas..
Class 6	General use restricted and/or governed by environmental and health standard limitations.	Not used in the Weber River drainage.

Table acronyms: WR-Weber River; WR&TR-Weber River and Tributaries; SCC&TR-Strongs Creek and Tributaries; BC&TR-Burch Creek and Tributaries; SC&TR-Spring Creek and Tributaries; OR&TR-Ogden River and Tributaries; WC&TR-Wheeler Creek and Tributaries; PR-Pineview Reservoir.

Table 12-2
WASTEWATER TREATMENT PLANT SUMMARY

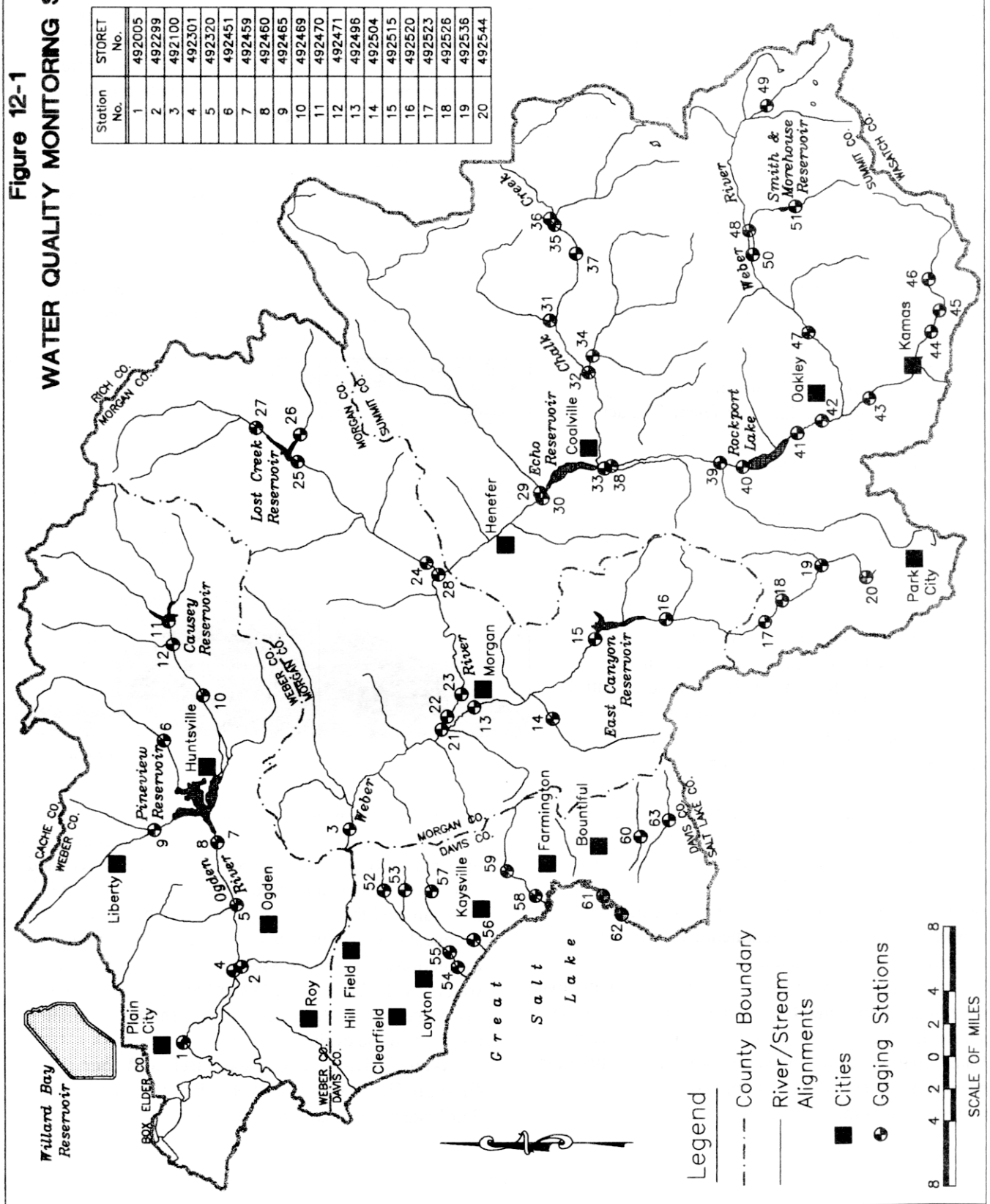
Facility	Process	Point of Discharge	Est. Annual Discharge (acre-feet)
South Davis South	Trickling Filter	Great Salt Lake	7,300
South Davis North	Trickling Filter	Great Salt Lake	8,000
Central Davis	Oxidation Ditch	Great Salt Lake	5,400
North Davis	Oxidation Ditch	Great Salt Lake	18,000
Snyderville EC	Oxidation Ditch	East Canyon Creek	1,800
Snyderville SC	Oxidation Ditch	Silver Creek	1,600
Central Weber	Trickling Filter	Irrigation Canal	44,800
Coalville City	Oxidation Ditch	Chalk Creek	300
Plain City	Facultative Lagoon	Dix Creek	1,000
Mt. Green	Facultative Lagoon	Weber River	100
Henefer Town	Facultative Lagoon	Weber River	100
Kamas City	Facultative Lagoon	Weber River	400
Oakley City	Facultative Lagoon	Weber River	100
Morgan City	Aerated Lagoon	Weber River	200
Total Average Annual Effluent Discharge			89,100

Point Source Pollution - Fourteen wastewater treatment facilities currently discharge secondary effluent to the basin's surface waters including the Great Salt Lake. In addition to domestic wastewater, 12 industrial businesses are subject to UPDES effluent regulations. These industrial businesses include mineral mining plants near the shores of the Great Salt Lake, petrochemical processing plants, specialty processing and manufacturing facilities, large retail and wholesale

warehouses, cement and rock products processing plants, and Hill Air Force Base.

Non-Point Source Pollution (NPS) Programs - As required by Section 319 of the CWA, the Division of Water Quality administers a non-point source pollution program to assess NPS water pollution issues. In cooperation with various state and federal agencies, the Division of Water Quality prepares a non-point source management plan and a watershed best management

Figure 12-1
WATER QUALITY MONITORING STATIONS



practices plan. The Division of Water Quality has also established a priority list of critical watersheds with water quality related problems or issues. The Weber River Basin is included on this list.

In addition to assessing pollution issues and preparing management plans, the NPS program also allows for the implementation of on-site projects to effectively improve water quality in drainages impacted by poor land management practices. The Utah Department of Agriculture and Utah Non-Point Source Task Force play significant roles with the administration of these on-site projects.

12.3.3 Federal Clean Water Act

In 1972, Congress passed the federal Water Pollution Control Act (FWPCA) to establish regulations and programs designed to make significant improvements regarding the quality of the nation's waters. The FWPCA was amended in 1977 and became the Clean Water Act (CWA). The CWA amendments provided additional regulations to deal with the growing national toxic water pollutant problem. The act further refined EPA's enforcement priorities and substantially increased the authority to enforce new federal mandates.

In the mid-1950s, the federal government began offering funding programs to state water pollution control agencies to assist in the ongoing construction of wastewater treatment facilities. These early grants provided funding to cover 30 to 55 percent of all construction costs for a given wastewater treatment facility. These federal grants, along with monies provided through the Utah Water Pollution Control Act (UWPCA), funded the construction and expansion of a number of wastewater treatment facilities in the Weber River Basin. From 1972 to 1989, federal and state water quality program grants have provided over \$50 million dollars for the construction of wastewater treatment facilities.

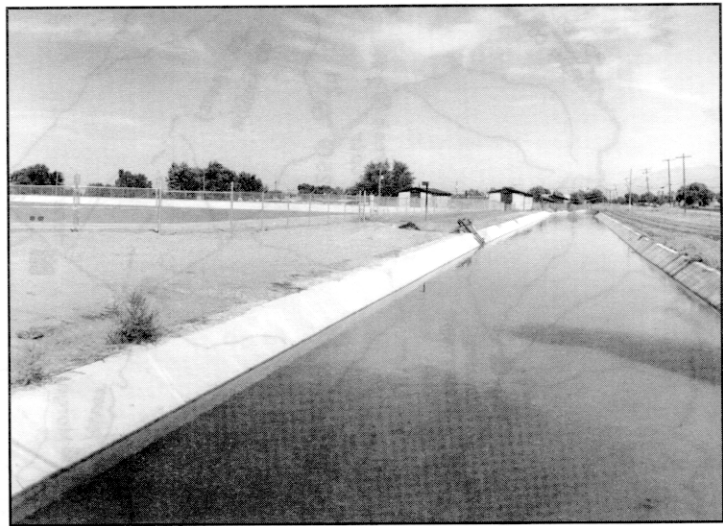
Public expenditures for public works projects drastically decreased by 1990, and most federally sponsored grant programs for the construction and upgrading of wastewater treatment facilities were eliminated. Currently, federal wastewater treatment facility funding is only available through revolving loan programs administered through individual state water quality agencies. State funding, through the Division of Water Quality, has averaged nearly \$4 million per year in recent years to construct and improve existing wastewater treatment facilities.

12.4 Water Quality Problems and Needs

Surface and groundwater quality is primarily determined by contaminant loadings from point source and non-point source discharges. Point source pollution comes from wastewater treatment facilities and large industrial processing plants. Non-point source pollution generally comes from natural sources such as runoff from agricultural fields, commercial and residential developments, industrial plants, silvicultural sites, construction sites, and underground septic tanks.

12.4.1 Surface Water Quality

Urbanization of the Weber River Basin has increased the discharge of domestic and industrial wastewaters to surrounding streams and underlying groundwater aquifers. In most cases, these discharges are in full compliance with state and federal regulations. Some areas of rapid growth, however, have generated



Davis-Weber Counties Canal

wastewater return flows that pose potential problems.

Surface water quality is monitored at 20 sites located at strategic locations along existing streams, rivers and reservoirs. Water samples taken at these monitoring sites are evaluated for a number of physical, biological and chemical parameters. Results of these water quality evaluations are used to assess the quality of surface waters by the Division of Water Quality. Violations of discharge permit regulations are determined from the results of these evaluations.

Weber River-Lower Reach Below Weber

Canyon-The reach of the Weber River from the Great Salt Lake to the Slaterville Diversion generally provides

water quality sufficient for non-game fish, water-related wildlife and food chain organisms, and is classified as 3C and 3D waters. The remainder of this reach provides water quality to support cold water game fish and is classified as 3A.

Recent studies completed by the Bureau of Reclamation and the Division of Water Quality have indicated lower Weber River water is treatable to culinary water standards. However, the cost of treatment, may be too high to support the construction and operation of a water treatment plant at this time. In the event lower basin water is treated to culinary standards, the beneficial use class would need to be changed to Class 1C according to state classification regulations.

Weber River-Weber Canyon to Echo Reservoir -
In most instances, the water quality in this reach of the Weber River is considered good to excellent and in compliance with Class 1 uses. But water quality in this reach is threatened by an increased loading of nutrients from the discharge of treated domestic and industrial wastewater from upstream towns and communities.

Wastewater treatment facilities at Mountain Green, Morgan, Henefer and the Snyderville Basin have all experienced substantial increases in collected wastewater flows in recent years. The most acute case of nutrient contamination currently exists in East Canyon Creek and Reservoir. The entire stream is classified as impaired for Class 3A standards. Discharge of treated wastewater with relatively high concentrations of some nutrients by the Snyderville Basin Sewer Improvement District has reduced the dissolved oxygen in portions of the East Canyon drainage. As a result, some eutrophication within East Canyon Reservoir has occurred.

Weber River-Echo Reservoir to Rockport Lake-
The water quality between Echo Reservoir and Rockport Lake meets Class 1C and 4 water quality standards, although it is impaired for Class 3A standards. Major water quality concerns include the deteriorated state of Chalk Creek which does not meet Class 3A standards and its impact on downstream reaches of the Weber River. Significant levels of zinc contamination occur in the Silver Creek drainage which has impaired its Class 3A rating. However, Silver Creek does meet the Class 1C drinking water standard with proper treatment.

Data taken from Chalk Creek indicate severe sediment and phosphorous loads are generated from poor land use practices throughout the upper drainage. Overgrazing of agricultural rangeland and the poor maintenance of service roads to existing oil exploration and pumping facilities have contributed to the

degradation of water quality and overall condition of the watershed. As a result, the volume and frequency of direct surface runoff events to Chalk Creek have increased substantially.

The Ogden River System-One of the major sources of pollution to Pineview Reservoir is the loading of nutrients from existing irrigation canals and runoff from irrigated fields. The diversion of irrigation water from one drainage to another changes the seasonal flow regimes and inflows to the reservoir. As a result, water quality and nutrient loadings from sub-basin sources increase by comingling watershed runoff with agricultural return flows before discharging to the reservoir.

The most significant threat to water quality at Pineview Reservoir is the migration of shallow contaminated groundwater to the reservoir. Most of the groundwater in the immediate area is subject to infiltration of effluent from residential and commercial septic tanks. Although current water quality in Pineview Reservoir is adequate for culinary treatment and boating-related recreation, the potential for excessive nutrient loading exists and should be evaluated on a regular basis.

12.4.2 Groundwater Quality

The contamination of existing groundwater aquifers has become an issue at Hill Air Force Base (HAFB). Toxic and carcinogenic elements have been found in groundwater samples taken within base boundaries. The level of contamination to the immediate and surrounding groundwater aquifer has been evaluated by private consultants and the Army Corps of Engineers. Currently, HAFB site-environmental personnel are in the process of implementing a number of long-term solutions to manage the extent and spread of existing groundwater contaminants. These solutions include the construction of a slurry trench to cut off the further spread of contaminated groundwater to surrounding communities, the construction of underground drainage systems to intercept contaminated groundwater, and the installation of extraction wells to control groundwater gradients. The clean-up program is expected to require 50 years to achieve total confinement of on-base contaminated groundwater.

12.4.3 Great Salt Lake Basin Water Quality Study

The U.S. Geological Survey started the *Great Salt Lake National Water Quality Assessment (NAWQA)* study in 1996. The program is funded by the federal

government and includes the drainage basins of the Bear, Weber and Jordan rivers. The long-term goals of the NAWQA program are to describe the status of and trends in the quality of a large, representative part of the nation's surface and groundwater resources. The program is intended to produce a wealth of water-quality information that will be useful to policy makers and managers at the federal, state and local levels.

12.5 Alternative Solutions

Water quality problems in the Weber River Basin are well documented in various studies and reports by local, state and federal regulatory agencies. These reports and studies have outlined a number of actions that can be taken to improve or mitigate existing problems associated with declining water quality. The final solution of existing water quality problems requires the implementation of the recommendations given in these studies.

12.6 Issues and Recommendations

Water quality issues in the Weber River Basin are centered around poor land management practices and the overall urbanization of the basin. Significant issues include continued overgrazing of rangeland, excessive return flows to existing streams from irrigated agricultural lands, excessive contaminant discharge from existing wastewater treatment facilities, deterioration of existing stream channels, and poor land management practices associated with oil and gas exploration and mining.

12.6.1 Excessive Nutrient Loadings at East Canyon Reservoir

Issue-Increased domestic wastewater outflow and watershed runoff from the Snyderville Basin has caused a measurable decline in water quality and created some eutrophication in East Canyon Reservoir.

Discussion-Within the Snyderville Basin, increased residential growth has resulted in excessive nutrient loads to local wastewater treatment facilities. Although domestic wastewater is treated to full secondary standards, excessive nutrient loads have been passed from local treatment facilities to East Canyon Creek and Reservoir. This increase in nutrient loading has resulted in reduced dissolved oxygen and eutrophication in East Canyon Reservoir. The severity of the problem is currently under study through a joint effort between the Weber Basin Water Management Council and the Division of Water Quality. Preliminary data indicate a

continuation of current nutrient loading rates to East Canyon Creek will eventually result in a deterioration of the existing fishery at East Canyon Reservoir and degradation of water quality within the lower watershed.

The Snyderville Basin Sewer Improvement District may be required to install tertiary treatment facilities at its two wastewater treatment plants discharging to the East Canyon and Silver Creek drainages.

Recommendation-The Weber Basin Water Quality Management Council and the Division of Water Quality should develop an action plan to monitor the nutrient impact on East Canyon Creek.

12.6.2 Chalk Creek Land Use Management and Water Quality

Issue-Sediment loading has reduced water quality in Chalk Creek to levels in violation of state standards established for Class 3 cold water fisheries.

Discussion-The Chalk Creek drainage has been identified as a critical watershed by a recent non-point source management plan (NPSMP) prepared through a cooperative effort of several local, state and federal water quality agencies. The NPSMP identified a number of water quality problems including 1) the loss of watershed cover through overgrazing of rangeland by livestock and wildlife, 2) construction and poor maintenance of access roads and facility installations associated with oil and gas exploration activities, and 3) erosion of existing channel banks due to inappropriate channel maintenance activities. Current land use practices and mining activities have resulted in excessive sediment loads. Sediment loading rates in Chalk Creek and deposits in Echo Reservoir need to be reduced so that water quality will meet state Class 3 standards.

Recommendation-The Chalk Creek Steering Committee and other appropriate entities should accelerate the implementation of the *Coordinated Resource Management Plan* to reduce sediment loads.

